CLAIMS:

1. A power supply unit having

- a switching device (18) for converting an intermediate circuit voltage (U_Z) into a switched voltage (U_{WR}),

- and a resonant circuit (20) that is fed by the switched voltage (U_{WR}) and has a transformer (T) for supplying an output voltage,

- and having a control device (30, 32) for setting at least one correcting variable (T_{PW}) for actuating the switching device (18),

- where the control device (30, 32) is provided to process sample values of at least a first actual value (U_{out}) which depends on the output voltage, and to calculate a time difference value (ΔU_{out}) from two sample values,

- where the difference value (ΔU_{out}) is multiplied by a first controller coefficient (k_{out}) and the result is used in the calculation of the correcting variable (T_{PW}),

- and where the value of the first controller coefficient (k_{out}) is changeable as a function of the operating point of the power supply unit.

2. A power supply unit as claimed in claim 1, in which

- during the calculation of the correcting variable (T_{PW}) a second actual value (U_L) is processed, which second actual value depends on the current through the resonant circuit (20),

- where a time difference value (ΔU_L) is calculated from sample values of the second actual value (U_L) and is multiplied by a second controller coefficient (k_L),

- where the value of the second controller coefficient (k_L) is changeable as a function of the operating point of the power supply unit (10).

3. A power supply unit as claimed in one of the preceding claims, in which

- the control device (30, 32) processes the intermediate circuit voltage (U_Z) as third actual value,

- where the processing is preferably effected in that a difference value of the intermediate circuit voltage (ΔU_Z) is multiplied by a controller coefficient (k_Z) and added to other variables, and the result is temporally summed,

- where the controller coefficient (k_Z) is preferably changeable as a function of the operating point of the power supply unit (10).

4. A power supply unit as claimed in one of the preceding claims, in which

- the control device (30, 32) has a structure in which

- the control deviation, difference values (ΔU_{out}, ΔU_L) from actual values and a coupled-back, time-delayed difference value of the correcting variable (T_{PW}) are in each case multiplied by controller coefficients (k_I, k_{out}, k_L, k_E) and added up,

- and the result is temporally summed,

- where one, a number, or all of the controller coefficients (k_I, k_{out}, k_L, k_E) are changeable as a function of the operating point of the power supply unit (10).

5. A power supply unit as claimed in one of the preceding claims, in which

- the operating-point-dependent controller coefficient or coefficients (k_{out}, k_L, k_E, k_I, k_Z) are taken from two-dimensional tables,

- where each table contains for each pair of values of a first indexing variable, which depends on the correcting variable (T_{PW}),

- and a second indexing variable, which depends on one or more of the processed actual values (U_L),

- the respective value of the controller coefficient (k_{out}, k_L, k_I, k_E, k_Z).

6. A power supply unit as claimed in one of the preceding claims, in which

- the control device (30, 32) supplies a scalar correcting variable (T_{PW}),

- from which there is calculated a setting for actuating the switching device (18) in order to generate the switched voltage (U_{WR}).

7. A power supply unit as claimed in one of the preceding claims, in which

- in a first operating mode for low output powers the switching device (18) is actuated by the pulse width being changed at an essentially constant switching frequency that is lower than the resonant frequency at least by a predefined factor,

- and in a second operating mode for higher output powers the switching device (18) is actuated by the switching frequency varying in the region of the resonant frequency.

8. A power supply unit as claimed in one of the preceding claims, in which
- the control device (30, 32) comprises at least a first controller unit (34) and a second controller unit (36),
- where the first controller unit (34) predefines a first correcting variable in order to regulate at least one actual value (U_{out}) to a desired value (U_{soll}),
- and the second controller unit (36) predefines a second correcting variable in order to regulate an electrical variable of the resonant circuit (20) to a permissible maximum value,
- where in each case the lower of the two correcting variables is used for actuation.

9. A power supply unit as claimed in one of the preceding claims, in which
- the control device is formed as a digital control device having a central processing unit,
- where measured values of at least a first actual value (U_{out}) are digitized and at least one correcting variable (T_{PW}) is calculated in order to supply a switched voltage having a timing interval,
- where measured values of only some of the timing intervals are processed.

10. An X-ray device having
- a power pack (14, 16) for supplying an intermediate circuit voltage (U_Z),
- a power supply unit (10) as claimed in one of the preceding claims which is supplied with power by the intermediate circuit voltage (U_Z),
- and an X-ray tube (12) which is fed by the output voltage of the power supply unit (10).

11. A method of controlling a power supply unit (10) having a switching device (18) for converting an intermediate circuit voltage (U_Z) into a switched voltage (U_{WR}), and a resonant circuit (20) that is fed by the switched voltage (U_{WR}) and has a transformer (T), and

possibly a rectifier circuit, for supplying an output voltage, in which, in order to form a correcting variable (T_{PW}) for actuating the switching device

- a time difference value (ΔU_{out}) is calculated from sample values of a first actual value (U_{out}) and is multiplied by a first controller coefficient (k_{out}),
- where the value of the first controller coefficient (k_{out}) can change as a function of the operating point of the power supply unit (10).